FIG. 1

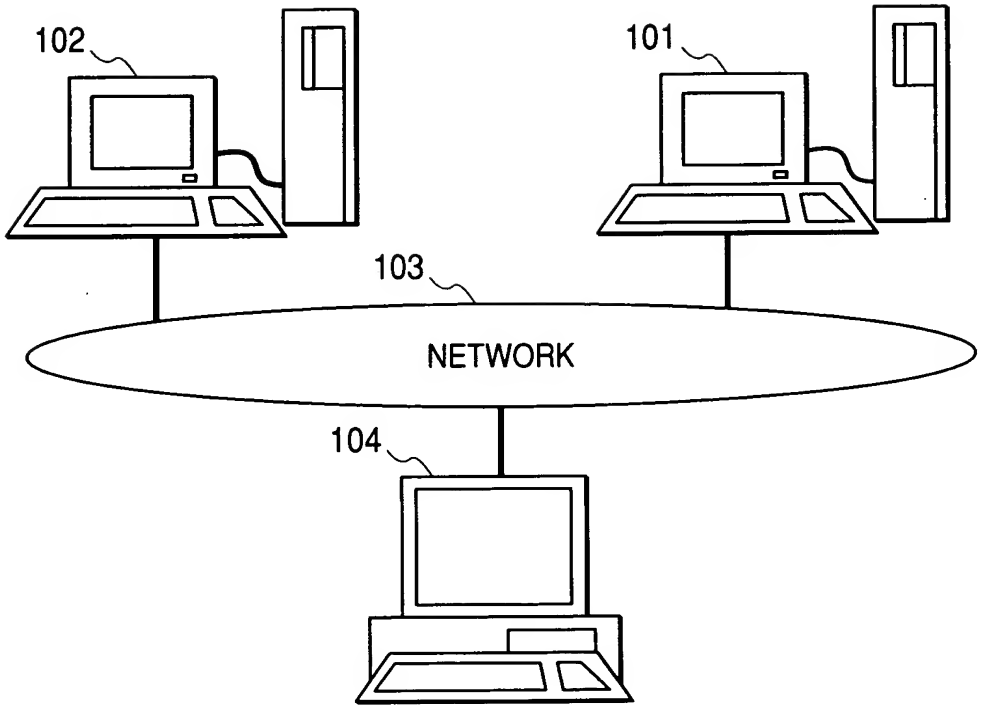


FIG. 2

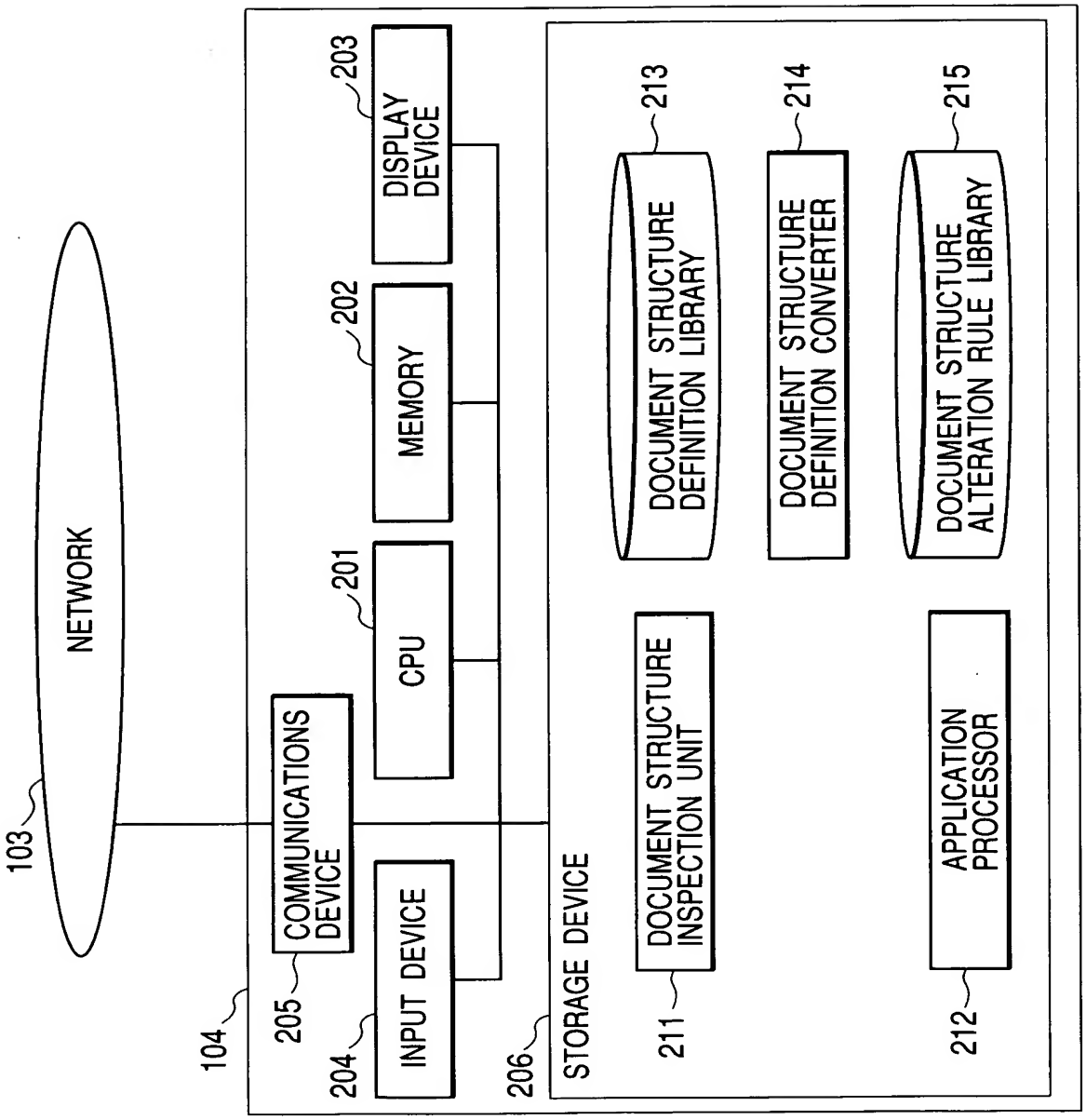

NETWORK
103
104
COMMUNICATIONS DEVICE
205
CPU
201
MEMORY
202
DISPLAY DEVICE
203
INPUT DEVICE
204
STORAGE DEVICE
206
DOCUMENT STRUCTURE INSPECTION UNIT
211
APPLICATION PROCESSOR
212
DOCUMENT STRUCTURE DEFINITION LIBRARY
213
DOCUMENT STRUCTURE DEFINITION CONVERTER
214
DOCUMENT STRUCTURE ALTERATION RULE LIBRARY
215

FIG. 3

```
01  <!DOCTYPE PurchaseOrder[
02    <!ELEMENT PurchaseOrder (UserID, Price, CreditCard)>
03      <!ATTLIST PurchaseOrder Id ID #IMPLIED>
04    <!ELEMENT UserID (#PCDATA)>
05    <!ELEMENT Price (#PCDATA)>
06    <!ELEMENT CreditCard (Issure, Number, Expire, Owner)>
07    <!ELEMENT Issure (#PCDATA)>
08    <!ELEMENT Number (#PCDATA)>
09    <!ELEMENT Expire (#PCDATA)>
10    <!ELEMENT Owner (#PCDATA)>
11]>
```

320

FIG. 4

```
01  <?Xml version="1.0"?>
02  <!DOCTYPE PurchaseOrder SYSTEM "PurchaseOrder.dtd">
03  <PurchaseOrder>
04    <UserID>10194970</UserID>
05    <Price>100000</Price>
06    <CreditCard>
07    <Issur>SDL</Issuer>
08    <Number>1234-5678-9012-3456</Number>
09    <Expire>12/05</Expire>
10    <Owner>Larry Gates</Owner>
11   </CreditCard>
12  </PurchaseOrder>
```

FIG. 5

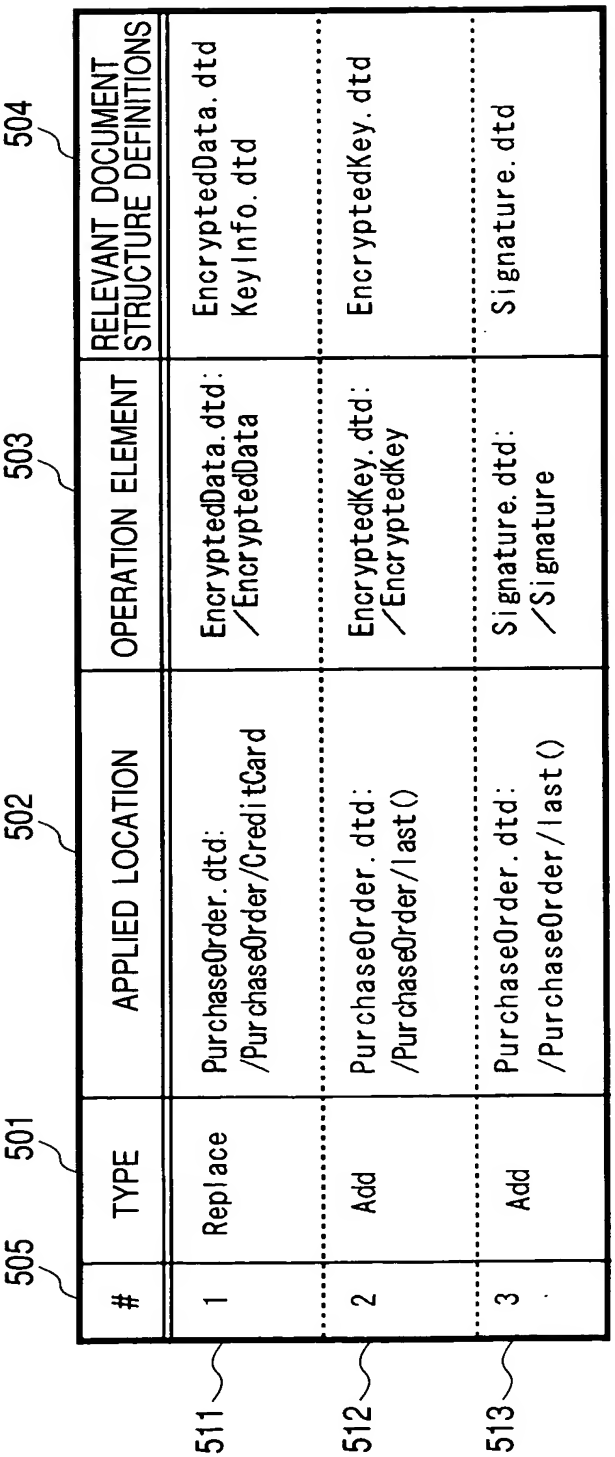

505
501
502
503
504
#
TYPE
APPLIED LOCATION
OPERATION ELEMENT
RELEVANT DOCUMENT STRUCTURE DEFINITIONS
1
Replace
PurchaseOrder.dtd: /PurchaseOrder/CreditCard
EncryptedData.dtd: /EncryptedData
EncryptedData.dtd KeyInfo.dtd
2
Add
PurchaseOrder.dtd: /PurchaseOrder/last()
EncryptedKey.dtd: /EncryptedKey
EncryptedKey.dtd
3
Add
PurchaseOrder.dtd: /PurchaseOrder/last()
Signature.dtd: /Signature
Signature.dtd
511
512
513

FIG. 6

601

```
01 <!DOCTYPE EncryptedData[
02  <!ELEMENT EncryptedData (EncryptionMethod,KeyInfo,CipherData)>
03     <!ATTLIST EncryptedData Id ID #REQUIRED>
04   <!ELEMENT EncryptionMethod(#PCDATA)>
05     <!ATTLIST EncryptionMethod Algorithm CDATA #REQUIRED>
06   <!ELEMENT CipherData(CipherValue)>
07   <!ELEMENT CipherValue(#PCDATA)>
08 ]>
```

FIG. 7

```
01<!DOCTYPE EncryptedKey [
02  <!ELEMENT EncryptedKey(EncryptionMethod,KeyInfo,CipherData,ReferenceList>
03    <!ATTLIST EncryptedKey Id ID #REQUIRED>
04  <!ELEMENT ReferenceList(DataReference | Key Reference)+>
05  <!ELEMENT DataReference(#PCDATA)>
06    <!ATTLIST DataReference URI CDATA #REQUIRED>
07  <!ELEMENT KeyReference(#PCDATA)>
08    <!ATTLIST KeyReference URI CDATA #REQUIRED>
09 ]>
```

FIG. 8

```
01<!DOCTYPE Signature [
02  <!ELEMENT  Signature(SignedInfo, SignatureValue, KeyInfo?)>
03  <!ELEMENT  SignedInfo(CanonicalizationMethod, SignatureMetod, Reference+)>
04  <!ELEMENT  CanonicalizationMethod(#PCDATA)>
05    <!ATTLIST CanonicalizationMetod Algorithm CDATA #REQUIRED>
06  <!ELEMENT SignatureMethod(#PCDATA)>
07    <!ATTLIST SignatureMethod Algorithm CDATA #REQUIRED>
08  <!ELEMENT  Reference(DigestMethod, DigestValue)>
09    <!ATTLIST Reference URI CDATA #REQUIRED>
10  <!ELEMENT DigestMethod(#PCDATA)>
11    <!ATTLIST DigestMethod Algorithm CDATA #REQUIRED>
12  <!ELEMENT DigestValue(#PCDATA)>
13  <!ELEMENT SignatureValue(#PCDATA)>
14 ]>
```

FIG. 9

```
01<!DOCTYPE KeyInfo[
02  <!ELEMENT KeyInfo(RetrievalMethod | KeyName)>
03  <!ELEMENT RetrievalMethod(#PCDATA)>
04    <!ATTLIST RetrievalMethod
05          Type        CDATA       #REQUIRED
06          URI         CDATA       #REQUIRED>
07  <!ELEMENT KeyName(#PCDATA)>
08 ]>
```

FIG. 10

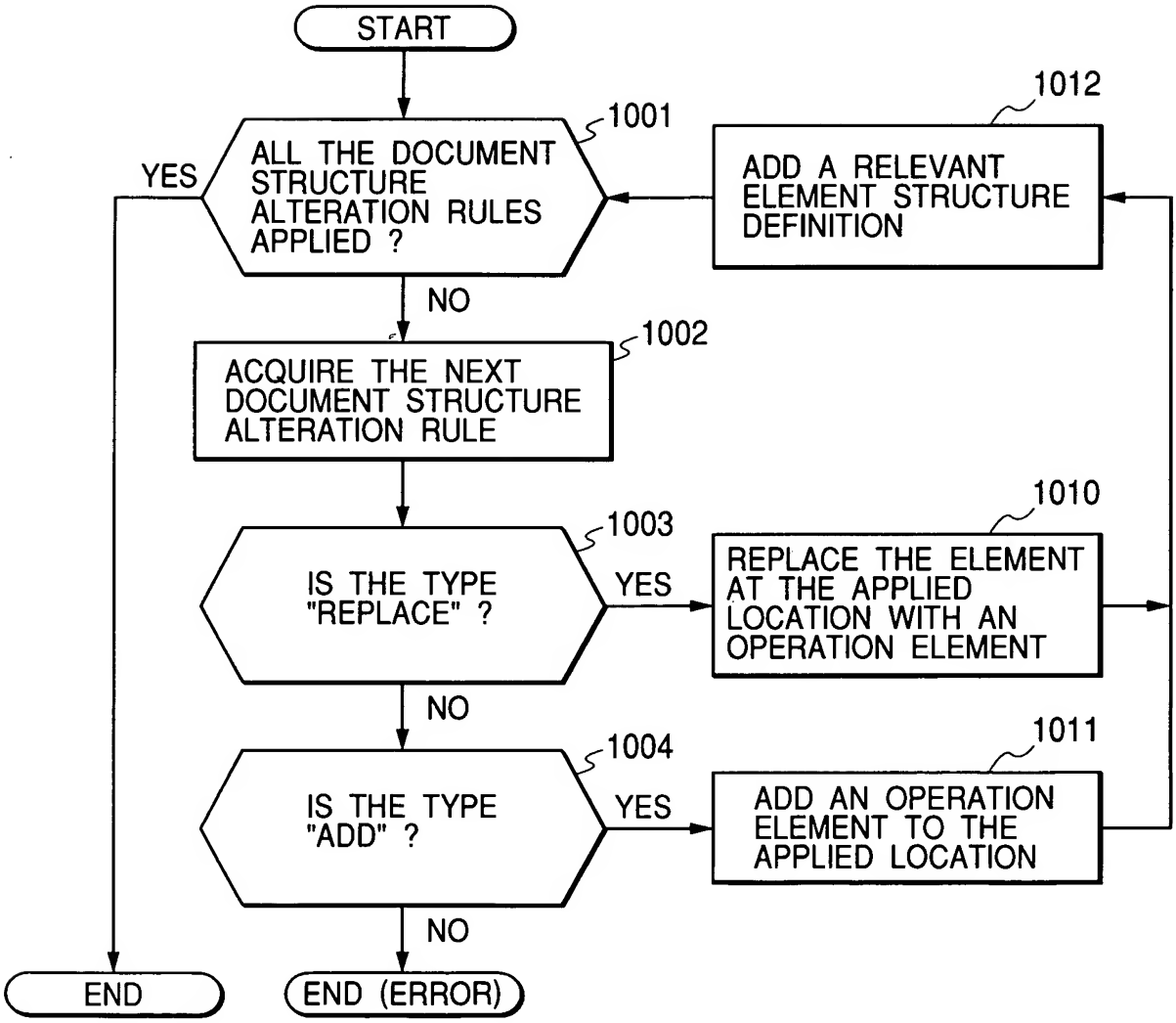

START
1001
ALL THE DOCUMENT STRUCTURE ALTERATION RULES APPLIED ?
YES
1012
ADD A RELEVANT ELEMENT STRUCTURE DEFINITION
NO
1002
ACQUIRE THE NEXT DOCUMENT STRUCTURE ALTERATION RULE
1003
IS THE TYPE "REPLACE" ?
YES
1010
REPLACE THE ELEMENT AT THE APPLIED LOCATION WITH AN OPERATION ELEMENT
NO
1004
IS THE TYPE "ADD" ?
YES
1011
ADD AN OPERATION ELEMENT TO THE APPLIED LOCATION
NO
END
END (ERROR)

FIG. 11

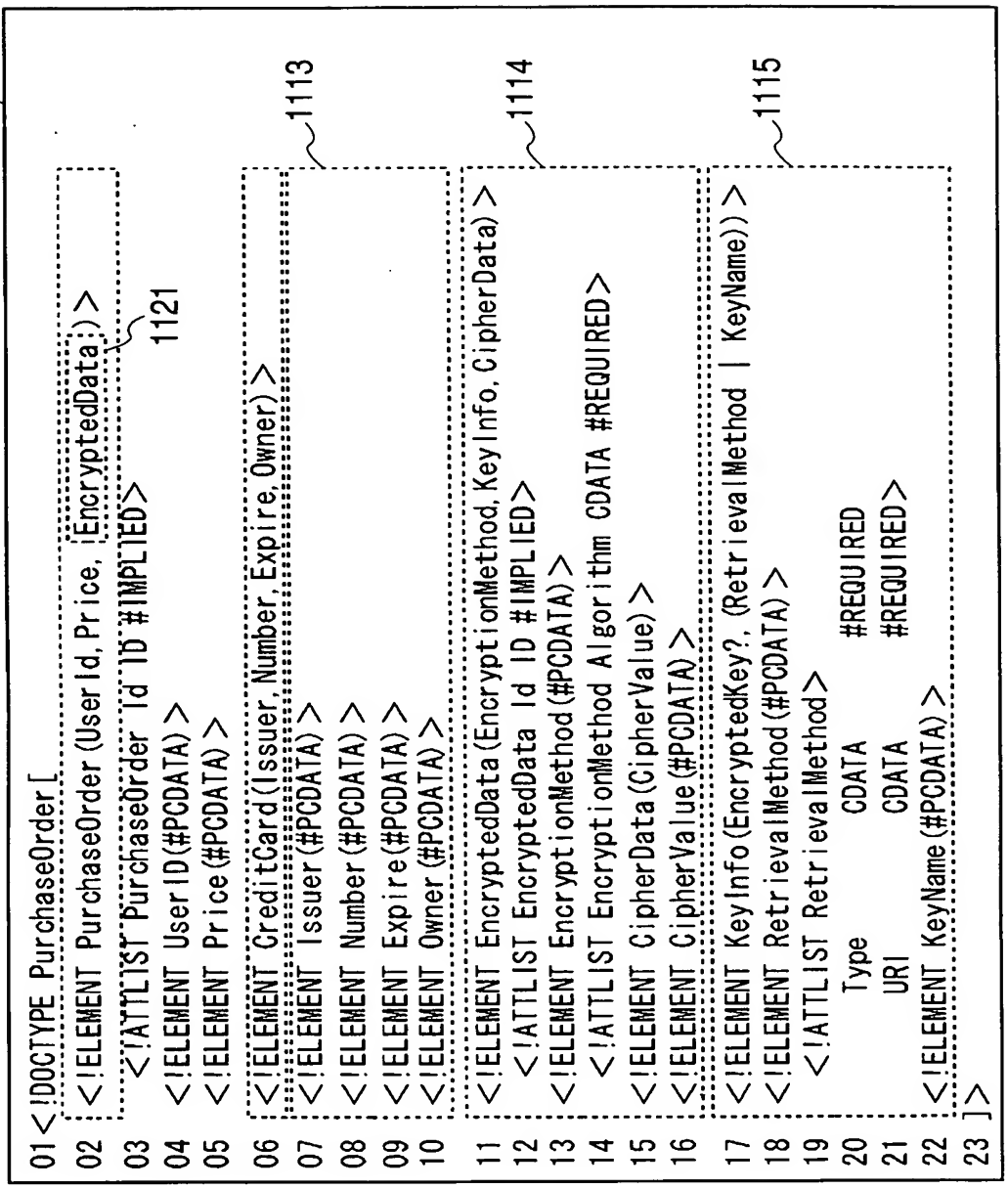

1101
01 <!DOCTYPE PurchaseOrder [
02 <!ELEMENT PurchaseOrder (UserId, Price, EncryptedData) >
03 <!ATTLIST PurchaseOrder Id ID #IMPLIED>
1121
04 <!ELEMENT UserID (#PCDATA) >
05 <!ELEMENT Price (#PCDATA) >
06 <!ELEMENT CreditCard (Issuer, Number, Expire, Owner) >
1113
07 <!ELEMENT Issuer (#PCDATA) >
08 <!ELEMENT Number (#PCDATA) >
09 <!ELEMENT Expire (#PCDATA) >
10 <!ELEMENT Owner (#PCDATA) >
11 <!ELEMENT EncryptedData (EncryptionMethod, KeyInfo, CipherData) >
1114
12 <!ATTLIST EncryptedData Id ID #IMPLIED>
13 <!ELEMENT EncryptionMethod (#PCDATA) >
14 <!ATTLIST EncryptionMethod Algorithm CDATA #REQUIRED>
15 <!ELEMENT CipherData (CipherValue) >
16 <!ELEMENT CipherValue (#PCDATA) >
17 <!ELEMENT KeyInfo (EncryptedKey?, (RetrievalMethod | KeyName)) >
1115
18 <!ELEMENT RetrievalMethod (#PCDATA) >
19 <!ATTLIST RetrievalMethod>
20 Type CDATA #REQUIRED
21 URI CDATA #REQUIRED>
22 <!ELEMENT KeyName (#PCDATA) >
23]>

FIG. 12

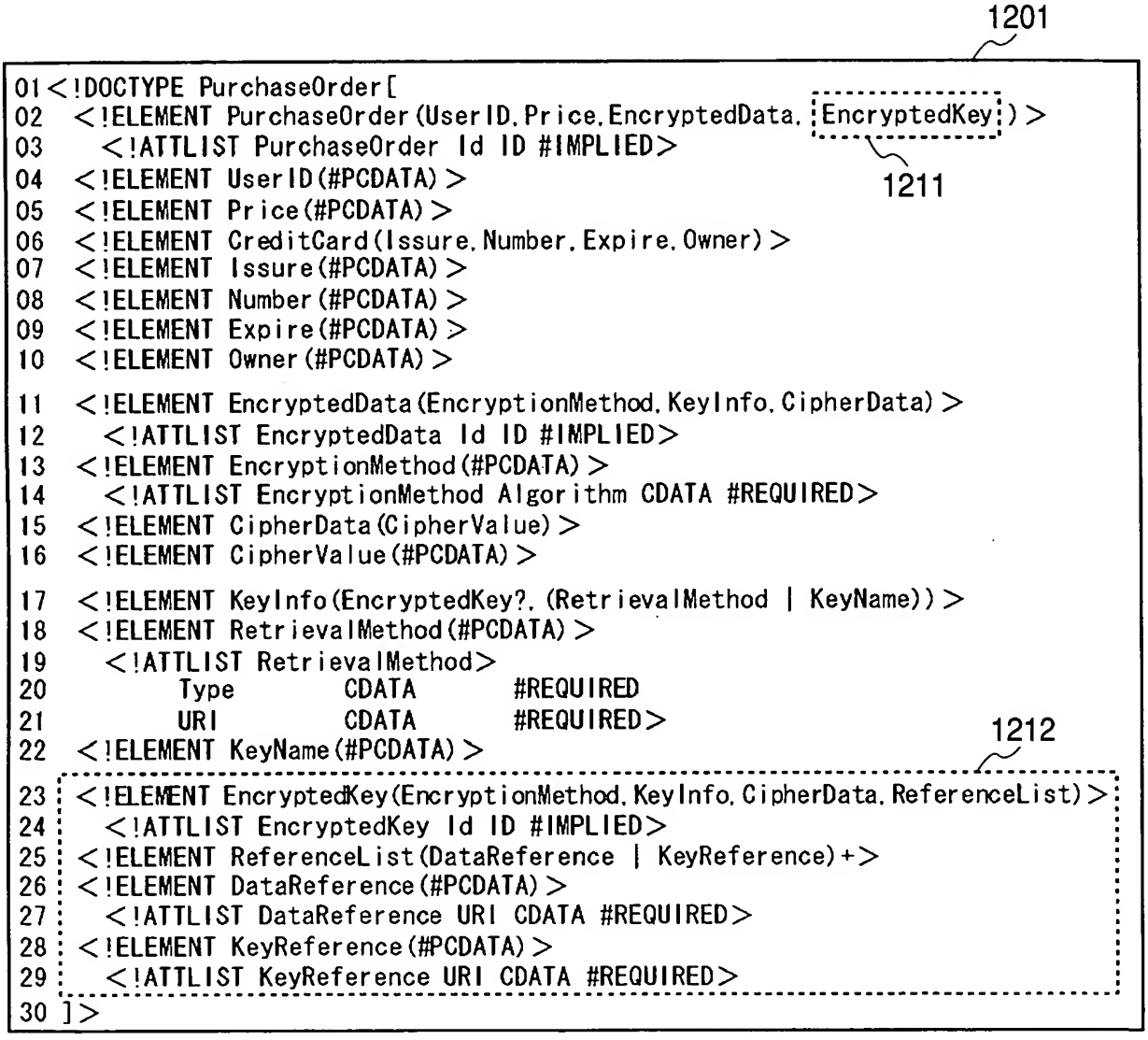

1201
1211
1212
01 <!DOCTYPE PurchaseOrder[
02 <!ELEMENT PurchaseOrder(UserID, Price, EncryptedData, EncryptedKey)>
03 <!ATTLIST PurchaseOrder Id ID #IMPLIED>
04 <!ELEMENT UserID(#PCDATA)>
05 <!ELEMENT Price(#PCDATA)>
06 <!ELEMENT CreditCard(Issure, Number, Expire, Owner)>
07 <!ELEMENT Issure(#PCDATA)>
08 <!ELEMENT Number(#PCDATA)>
09 <!ELEMENT Expire(#PCDATA)>
10 <!ELEMENT Owner(#PCDATA)>
11 <!ELEMENT EncryptedData(EncryptionMethod, KeyInfo, CipherData)>
12 <!ATTLIST EncryptedData Id ID #IMPLIED>
13 <!ELEMENT EncryptionMethod(#PCDATA)>
14 <!ATTLIST EncryptionMethod Algorithm CDATA #REQUIRED>
15 <!ELEMENT CipherData(CipherValue)>
16 <!ELEMENT CipherValue(#PCDATA)>
17 <!ELEMENT KeyInfo(EncryptedKey?, (RetrievalMethod | KeyName))>
18 <!ELEMENT RetrievalMethod(#PCDATA)>
19 <!ATTLIST RetrievalMethod>
20 Type CDATA #REQUIRED
21 URI CDATA #REQUIRED>
22 <!ELEMENT KeyName(#PCDATA)>
23 <!ELEMENT EncryptedKey(EncryptionMethod, KeyInfo, CipherData, ReferenceList)>
24 <!ATTLIST EncryptedKey Id ID #IMPLIED>
25 <!ELEMENT ReferenceList(DataReference | KeyReference)+>
26 <!ELEMENT DataReference(#PCDATA)>
27 <!ATTLIST DataReference URI CDATA #REQUIRED>
28 <!ELEMENT KeyReference(#PCDATA)>
29 <!ATTLIST KeyReference URI CDATA #REQUIRED>
30]>

FIG. 13

```
01 <!DOCTYPE PurchaseOrder[
02   <!ELEMENT PurchaseOrder (UserID, Price, EncryptedData, EncryptedKey, Signature?)>
03     <!ATTLIST PurchaseOrder Id ID #IMPLIED>
04   <!ELEMENT UserId (#PCDATA)>
05   <!ELEMENT Price (#PCDATA)>
06   <!ELEMENT CreditCard (Issure, Number, Expire, Owner)>
07   <!ELEMENT Issure (#PCDATA)>
08   <!ELEMENT Number (#PCDATA)>
09   <!ELEMENT Expire (#PCDATA)>
10   <!ELEMENT Owner (#PCDATA)>
11   <!ELEMENT EncryptedData (EncryptionMethod, KeyInfo, CipherData)>
12     <!ATTLIST EncryptdData Id ID #IMPLIED>
13   <!ELEMENT EncryptionMethod (#PCDATA)>
14     <!ATTLIST EncryptionMethod Algorithm CDATA #REQUIRED>
15   <!ELEMENT CipherData (CipherValue)>
16   <!ELEMENT CipherValue (#PCDATA)>
17   <!ELEMENT KeyInfo (EncryptedKey?, (RetrievalMethod | KeyName))>
18   <!ELEMENT RetrievalMethod (#PCDATA)>
19     <!ATTLIST RetrievalMethod
20           Type          CDATA       #REQUIRED
21           URI           CDATA       #REQUIRED>
22   <!ELEMENT KeyName (#PCDATA)>
23   <!ELEMENT EncryptedKey (EncryptionMethod, KeyInfo, CipherData, ReferenceList)>
24     <!ATTLIST EncryptedKey Id ID #MPLIED>
25   <!ELEMENT ReferenceList (DataReference | KeyReference)+>
26   <!ELEMENT DataReference (#PCDATA)>
27     <!ATTLIST DataReference URI CDATA #REQUIRED>
28   <!ELEMENT KeyReference (#PCDATA)>
29     <!ATTLIST KeyReference URI CDATA #REQUIRED>
30   <!ELEMENT Signature (SignedInfo, SignatureValue, KeyInfo?)>
31   <!ELEMENT SignedInfo (CanonicalizationMethod, SignatureMethod, Reference+)>
32   <!ELEMENT CanonicalizationMethod (#PCDATA)>
33     <!ATTLIST CanonicalizationMethod Algorithm CDATA #REQUIRED>
34   <!ELEMENT SignatureMethod (#PCDATA)>
35     <!ATTLIST SignatureMethod Algorithm CDATA #REQUIRED>
36   <!ELEMENT Reference (DigesMethod, DigestValue)>
37     <!ATTLIST Reference URI CDATA #REQUIRED>
38   <!ELEMENT DigestMethod (#PCDATA)>
39     <!ATTLIST DigestMethod Algorithm CDATA #REQUIRED>
40   <!ELEMENT DigestValue (#PCDATA)>
41   <!ELEMENT SignatureValue (#PCDATA)>
42 ]>
```

1311

1312

FIG. 14

1401

```
01<?Xml version="1.0"?>
02<!DOCTYPE PurchaseOrder SYSTEM "PurchaseOrder.dtd">
03<PurchaseOrder Id="po">
04    <UserID>10194970</UserID>
05    <Price>100000</Price>
06    <EncryptedData Id="poED">                                          1411
07      <EncryptionMethod Algorithm="http://www.w3.org/xmlenc#aes128"/>
08      <KeyInfo>
09        <RetrievalMethod Type="http://www.w3.org/xmlence#EncryptedKey"
10          URI="#opEK"/>
11      </KeyInfo>
12      <CipherData>
13        <CipherValue>SrYKzOa6iu/gi.....y5UZhTTaY9</CipherValue>
14      </CipherData>
15    </EncryptedData>
16    <EncryptedKey Id="poEK">                                           1412
17      <EncrypitionMethod Algorithm="http://www.w3.org/xmlenc#rsa"/>
18      <KeyInfo>
19        <KeyName>poWrapKey</KeyName>
20      </KeyInfo>
21      <CipherData>
22        <CipherValue>kjZVmUbShov4v.....wqbYwQri7QH</CipherValue>
23      </CipherData>
24      <ReferenceList>
25        <DataReference URi="#poED"/>
26      </ReferenceList>
27    </EncryptedKey>
28    <Signature>                                                        1413
29      <SignedInfo>
30        <CanonicalizationMethod Algorithm ="http:/www.w3.org/xml#c14n"/>
31        <SignatureMethod Algorithm ="http://www.w3.org/xmldsg#rsa-sha1"/>
32        <Reference URI="#po">
33          <DigestMethod Algorithm ="http://www.w3.org/xmldsig#sha1"/>
34          <DigestValue>AZAOVqTorSSJ70BCA/tLY93rFMs=</DigestValue>
35        </Reference>
36      </SignedInfo>
37      <SignatureValue>ZknUOaJsxNR5.....1nHhiG25PKg==</SignatureValue>
38      <KeyInfo>
39        <KeyName>Hitachi.SDL</KeyName>
40      </KeyInfo>
41    </Signature>
42</PurchaseOrder>
```

FIG. 15

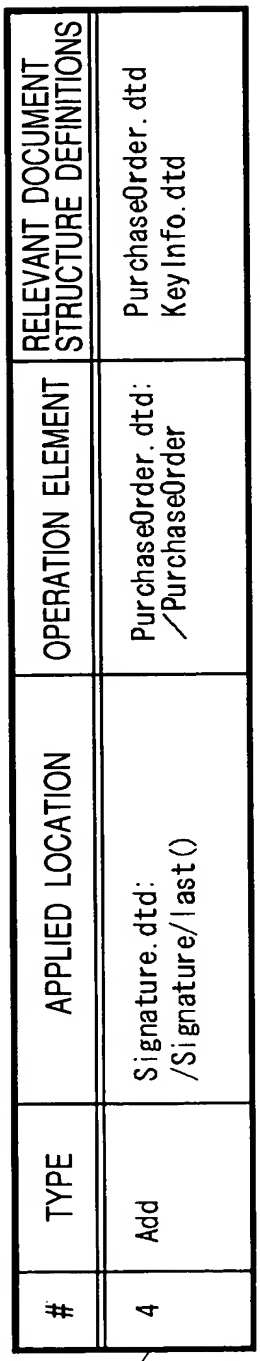

#
TYPE
APPLIED LOCATION
OPERATION ELEMENT
RELEVANT DOCUMENT STRUCTURE DEFINITIONS
4
Add
Signature.dtd: /Signature/last()
PurchaseOrder.dtd: /PurchaseOrder
PurchaseOrder.dtd
KeyInfo.dtd
1511

FIG. 16

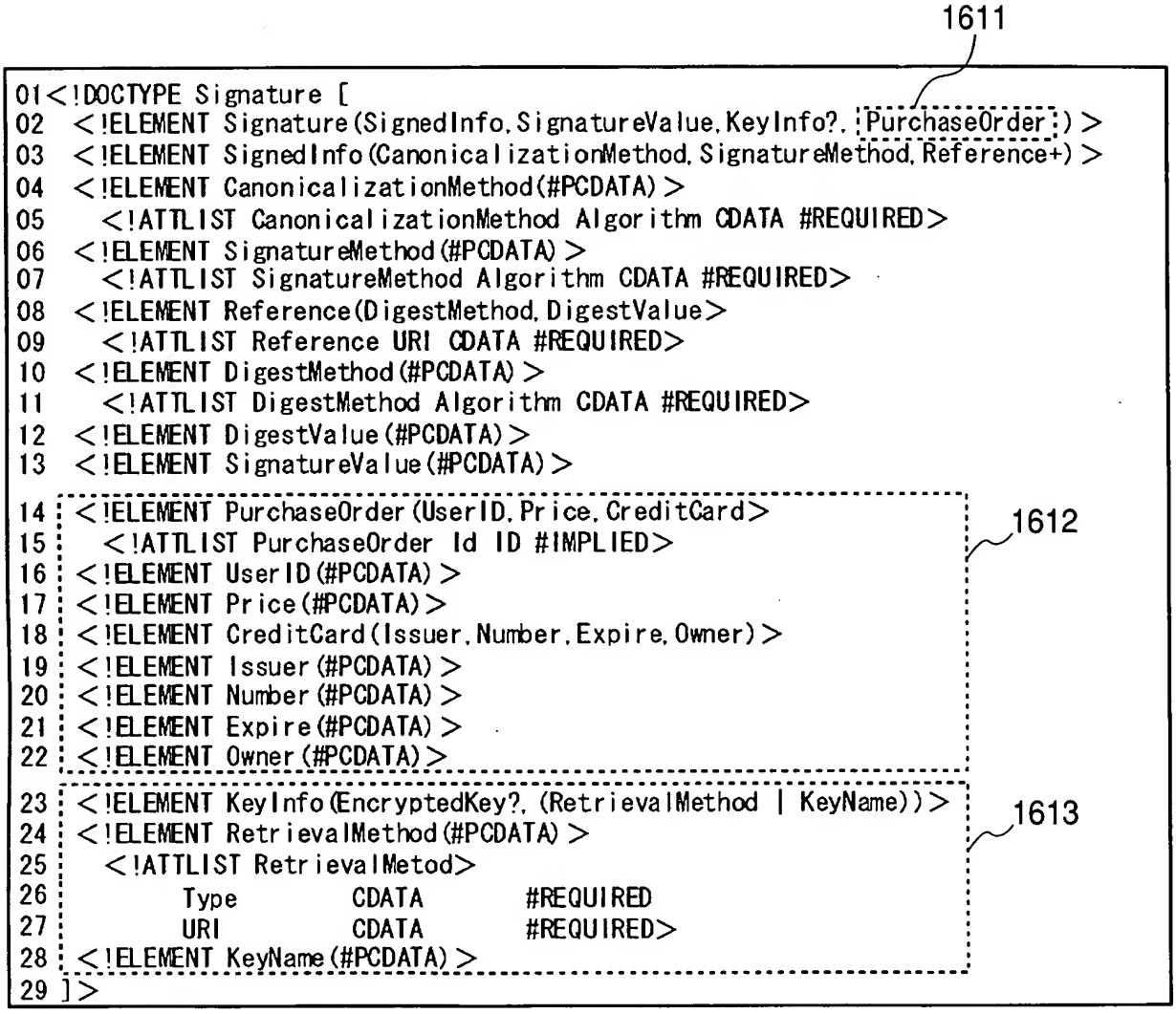

1611
01<!DOCTYPE Signature [
02 <!ELEMENT Signature(SignedInfo,SignatureValue,KeyInfo?,PurchaseOrder)>
03 <!ELEMENT SignedInfo(CanonicalizationMethod,SignatureMethod,Reference+)>
04 <!ELEMENT CanonicalizationMethod(#PCDATA)>
05 <!ATTLIST CanonicalizationMethod Algorithm CDATA #REQUIRED>
06 <!ELEMENT SignatureMethod(#PCDATA)>
07 <!ATTLIST SignatureMethod Algorithm CDATA #REQUIRED>
08 <!ELEMENT Reference(DigestMethod,DigestValue>
09 <!ATTLIST Reference URI CDATA #REQUIRED>
10 <!ELEMENT DigestMethod(#PCDATA)>
11 <!ATTLIST DigestMethod Algorithm CDATA #REQUIRED>
12 <!ELEMENT DigestValue(#PCDATA)>
13 <!ELEMENT SignatureValue(#PCDATA)>
14 <!ELEMENT PurchaseOrder(UserID,Price,CreditCard>
15 <!ATTLIST PurchaseOrder Id ID #IMPLIED>
16 <!ELEMENT UserID(#PCDATA)>
17 <!ELEMENT Price(#PCDATA)>
18 <!ELEMENT CreditCard(Issuer,Number,Expire,Owner)>
19 <!ELEMENT Issuer(#PCDATA)>
20 <!ELEMENT Number(#PCDATA)>
21 <!ELEMENT Expire(#PCDATA)>
22 <!ELEMENT Owner(#PCDATA)>
1612
23 <!ELEMENT KeyInfo(EncryptedKey?,(RetrievalMethod | KeyName))>
24 <!ELEMENT RetrievalMethod(#PCDATA)>
25 <!ATTLIST RetrievalMetod>
26 Type CDATA #REQUIRED
27 URI CDATA #REQUIRED>
28 <!ELEMENT KeyName(#PCDATA)>
1613
29]>

FIG. 17

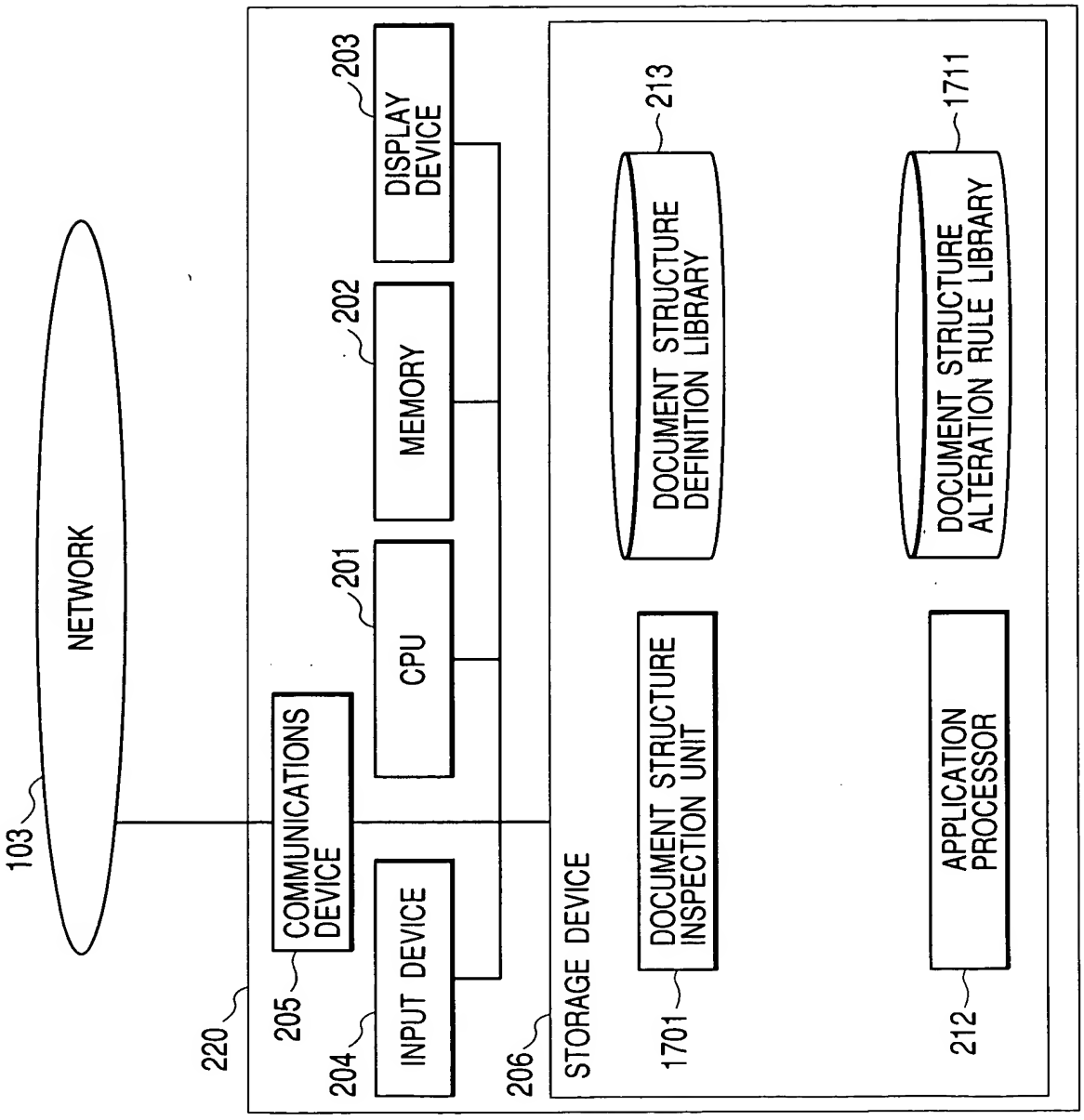

NETWORK
103
220
COMMUNICATIONS DEVICE
205
CPU
201
MEMORY
202
DISPLAY DEVICE
203
INPUT DEVICE
204
STORAGE DEVICE
206
DOCUMENT STRUCTURE INSPECTION UNIT
1701
DOCUMENT STRUCTURE DEFINITION LIBRARY
213
APPLICATION PROCESSOR
212
DOCUMENT STRUCTURE ALTERATION RULE LIBRARY
1711

FIG. 18

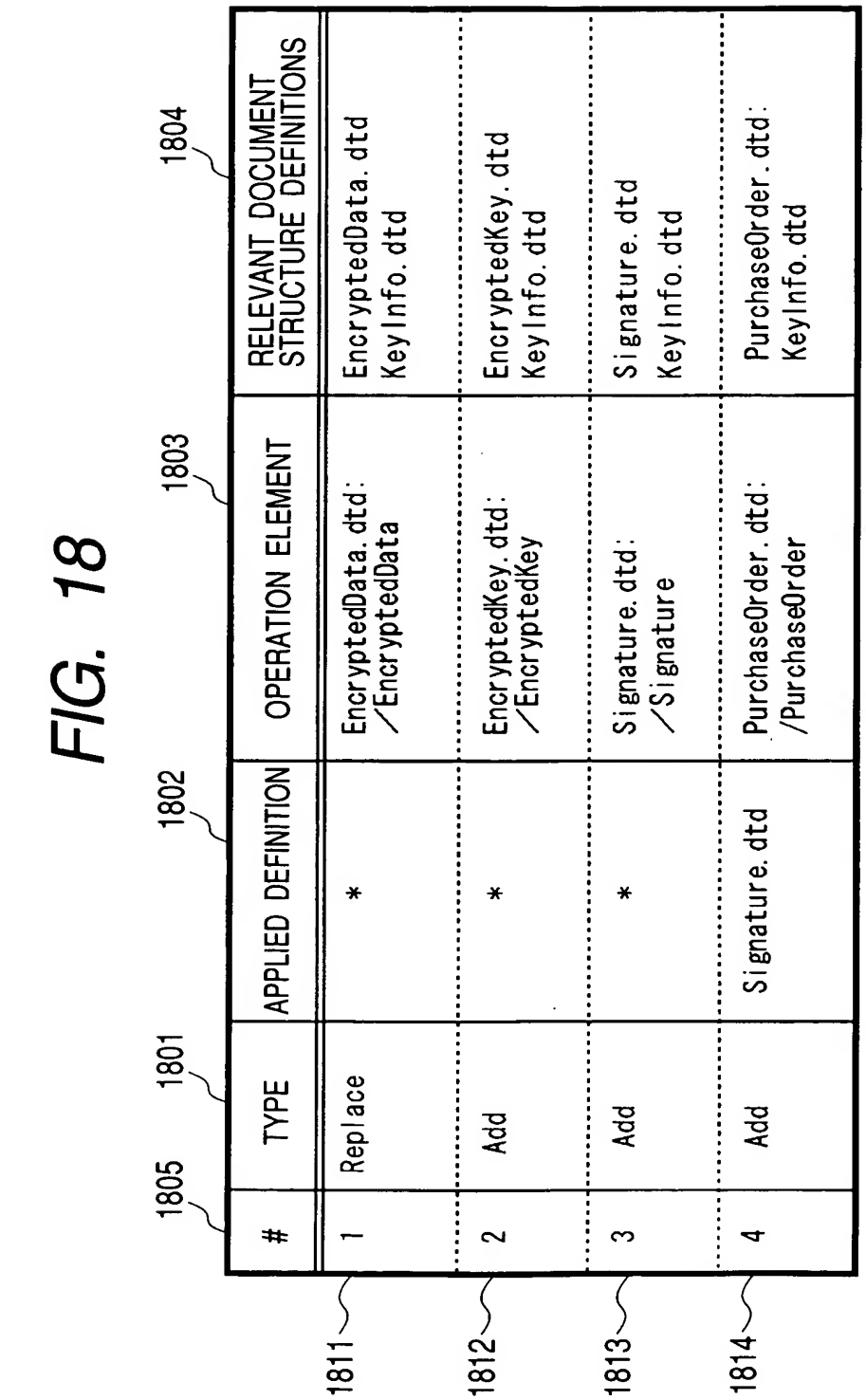

1805
1801
1802
1803
1804
| TYPE | APPLIED DEFINITION | OPERATION ELEMENT | RELEVANT DOCUMENT STRUCTURE DEFINITIONS
1 | Replace | * | EncryptedData.dtd: /EncryptedData | EncryptedData.dtd KeyInfo.dtd
2 | Add | * | EncryptedKey.dtd: /EncryptedKey | EncryptedKey.dtd KeyInfo.dtd
3 | Add | * | Signature.dtd: /Signature | Signature.dtd KeyInfo.dtd
4 | Add | Signature.dtd | PurchaseOrder.dtd: /PurchaseOrder | PurchaseOrder.dtd: KeyInfo.dtd
1811
1812
1813
1814

FIG. 19

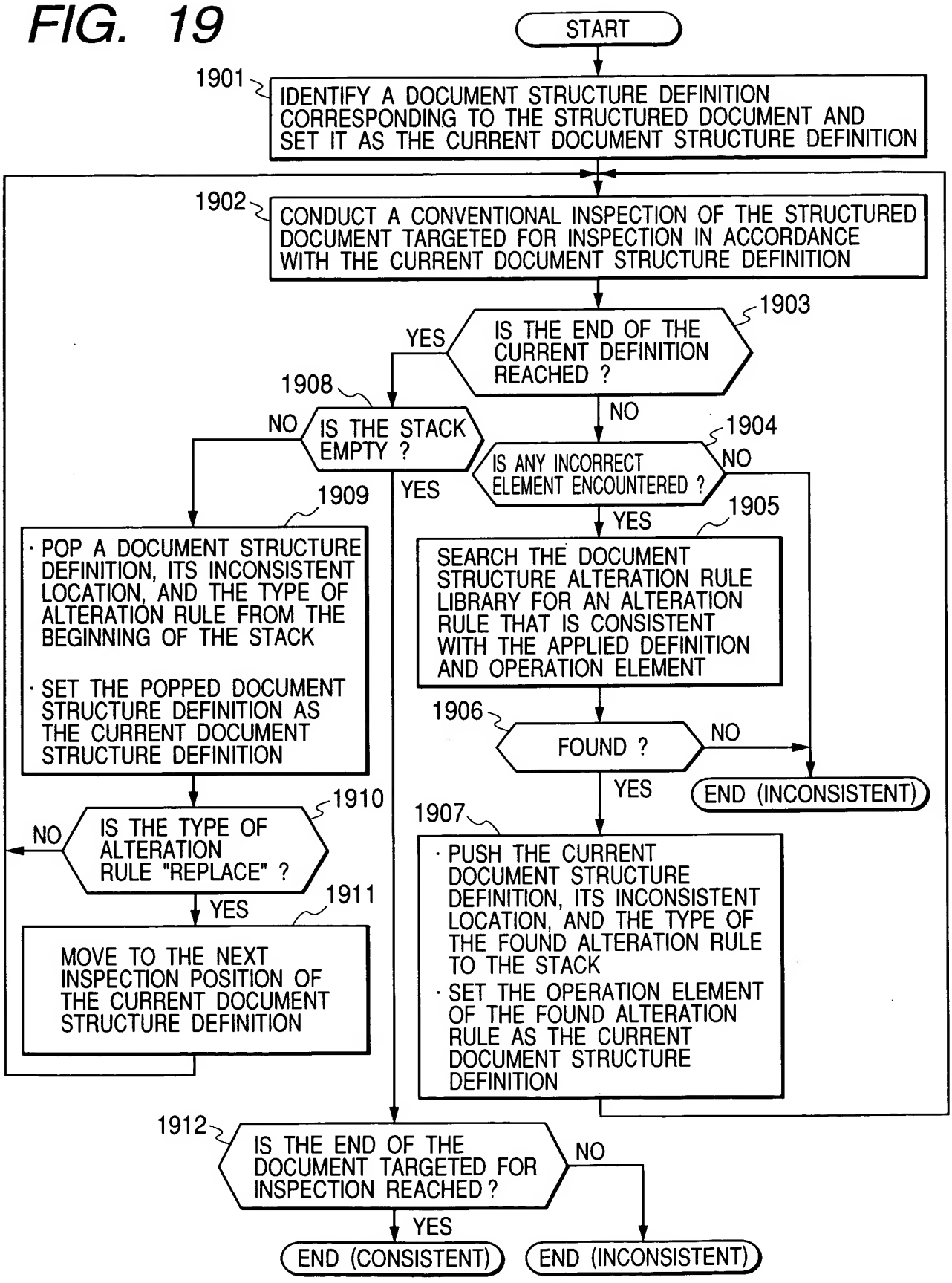

START
1901
IDENTIFY A DOCUMENT STRUCTURE DEFINITION CORRESPONDING TO THE STRUCTURED DOCUMENT AND SET IT AS THE CURRENT DOCUMENT STRUCTURE DEFINITION
1902
CONDUCT A CONVENTIONAL INSPECTION OF THE STRUCTURED DOCUMENT TARGETED FOR INSPECTION IN ACCORDANCE WITH THE CURRENT DOCUMENT STRUCTURE DEFINITION
1903
IS THE END OF THE CURRENT DEFINITION REACHED ?
YES
NO
1904
IS ANY INCORRECT ELEMENT ENCOUNTERED ?
NO
YES
1905
SEARCH THE DOCUMENT STRUCTURE ALTERATION RULE LIBRARY FOR AN ALTERATION RULE THAT IS CONSISTENT WITH THE APPLIED DEFINITION AND OPERATION ELEMENT
1906
FOUND ?
NO
YES
END (INCONSISTENT)
1907
· PUSH THE CURRENT DOCUMENT STRUCTURE DEFINITION, ITS INCONSISTENT LOCATION, AND THE TYPE OF THE FOUND ALTERATION RULE TO THE STACK
· SET THE OPERATION ELEMENT OF THE FOUND ALTERATION RULE AS THE CURRENT DOCUMENT STRUCTURE DEFINITION
1908
IS THE STACK EMPTY ?
NO
YES
1909
· POP A DOCUMENT STRUCTURE DEFINITION, ITS INCONSISTENT LOCATION, AND THE TYPE OF ALTERATION RULE FROM THE BEGINNING OF THE STACK
· SET THE POPPED DOCUMENT STRUCTURE DEFINITION AS THE CURRENT DOCUMENT STRUCTURE DEFINITION
1910
IS THE TYPE OF ALTERATION RULE "REPLACE" ?
NO
YES
1911
MOVE TO THE NEXT INSPECTION POSITION OF THE CURRENT DOCUMENT STRUCTURE DEFINITION
1912
IS THE END OF THE DOCUMENT TARGETED FOR INSPECTION REACHED ?
NO
YES
END (CONSISTENT)
END (INCONSISTENT)

FIG. 20

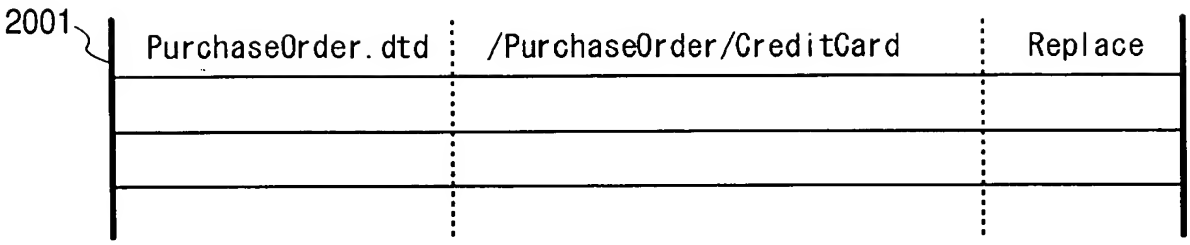

2001
PurchaseOrder.dtd
/PurchaseOrder/CreditCard
Replace

FIG. 21

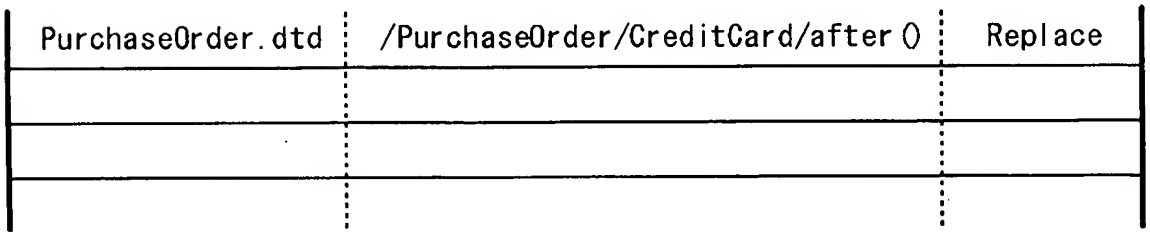
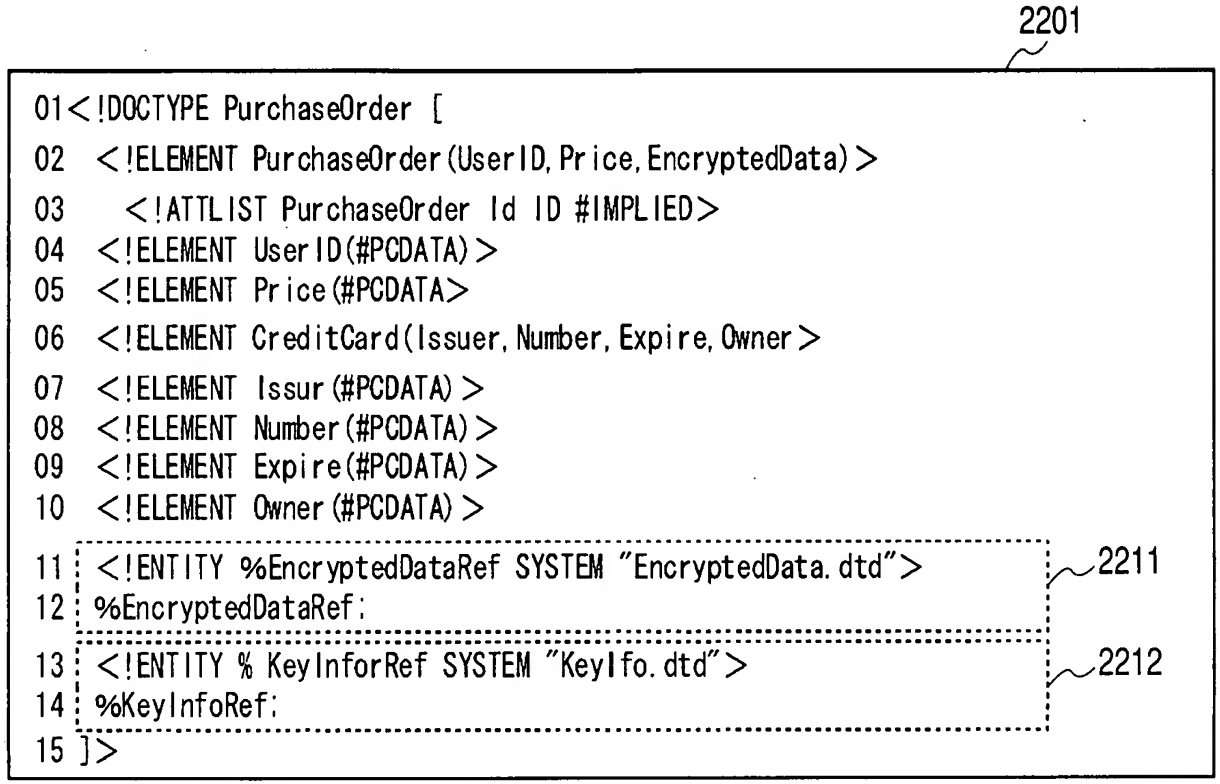

PurchaseOrder.dtd
/PurchaseOrder/CreditCard/after()
Replace

FIG. 22


2201
01<!DOCTYPE PurchaseOrder [
02 <!ELEMENT PurchaseOrder(UserID, Price, EncryptedData)>
03 <!ATTLIST PurchaseOrder Id ID #IMPLIED>
04 <!ELEMENT UserID(#PCDATA)>
05 <!ELEMENT Price(#PCDATA>
06 <!ELEMENT CreditCard(Issuer, Number, Expire, Owner>
07 <!ELEMENT Issur(#PCDATA)>
08 <!ELEMENT Number(#PCDATA)>
09 <!ELEMENT Expire(#PCDATA)>
10 <!ELEMENT Owner(#PCDATA)>
11 <!ENTITY %EncryptedDataRef SYSTEM "EncryptedData.dtd">
12 %EncryptedDataRef;
2211
13 <!ENTITY % KeyInforRef SYSTEM "KeyIfo.dtd">
14 %KeyInfoRef;
2212
15]>